Release Notes for BayRS Version 12.00

BayRS Version 12.00
Site Manager Software Version 6.00

BCC Version 3.10

Part No. 117400-A Rev. A
October 1997

Bay Networks

Bay Networks

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Technical Support

Bay Networks Customer Service

You can purchase a support contract from your Bay Networks distributor or authorized reseller, or directly from Bay Networks Services. For information about, or to purchase a Bay Networks service contract, either call your local Bay Networks field sales office or one of the following numbers:

Region	Telephone number	Fax number
United States and Canada	800-2LANWAN; then enter Express Routing Code (ERC) 290, when prompted, to purchase or renew a service contract 978-916-8880 (direct)	978-916-3514
Europe	33-4-92-96-69-66	33-4-92-96-69-96
Asia/Pacific	61-2-9927-8888	61-2-9927-8899
Latin America	561-988-7661	561-988-7550

Information about customer service is also available on the World Wide Web at *support.baynetworks.com*.

How to Get Help

If you purchased a service contract for your Bay Networks product from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance.

If you purchased a Bay Networks service program, call one of the following Bay Networks Technical Solutions Centers:

Technical Solutions Center	Telephone number	Fax number
Billerica, MA	800-2LANWAN	978-916-3514
Santa Clara, CA	800-2LANWAN	408-495-1188
Valbonne, France	33-4-92-96-69-68	33-4-92-96-69-98
Sydney, Australia	61-2-9927-8800	61-2-9927-8811
Tokyo, Japan	81-3-5402-0180	81-3-5402-0173

Release Notes for BayRS Version 12.00

This document contains the latest information about Bay Networks® Router Software Version 12.00.

These release notes include information about

- Upgrading to Version 12.00
- New Features
- New Guidelines for Working with Version 12.00
- Guidelines from Previous BayRS Releases
- Protocols Supported
- Standards Supported
- Flash Memory Cards Supported

Upgrading to Version 12.00

To upgrade BayRS to Version 12.00, or to upgrade your Site Manager software to Version 6.00, refer to *Upgrading Routers from Version 7-10.xx to Version 12.00*, also in your upgrade package.

New Features

Bay Networks has implemented the following new features in Version 12.00.

The Bay Command Console (BCC)

The BCC™ is replacing the trial versions released with Versions 11.02 and 11.01. It includes the following new features:

- Support for TCL script commands
- Verb first parser

  For example, we changed the command *<object>* **disable** to

  disable *<object>*
- Support for the ARE[1] processor card
- Improved online Help
- BCC instructions in the protocol-specific manuals

Refer to "Using the BCC" on page -10 for guidelines.

IP Services

We have added the following new features to the IP services software.

Multicast OSPF

Multicast OSPF (MOSPF, RFC 1584) enables routers to route IP multicast datagrams. The OSPF routing protocol determines the path for a unicast datagram based on the datagram's destination address only. The MOSPF protocol determines paths based on the source and the multicast destination addresses of the datagram. MOSPF also supports

- Inter-AS multicast routing with DVMRP
- Announce policies

1. The BCC runs on ARE processor cards to let you configure the protocols and interfaces listed later in this document. However, the BCC does not support ATM.

To configure Multicast OSPF, refer to "Guidelines for Configuring IP Multicasting and Multimedia Services" on page -22 and *Configuring IP Multicasting and Multimedia Services*.

Quality of Service Extensions to OSPF

For inter-area and intra-area multicast routing, Quality of Service extensions to OSPF (QOSPF) works with the Resource Reservation Protocol (RSVP) and Circuit Resource Management (CRM) to specify, request, and reserve resources. RSVP stipulates traffic characteristics. QOSPF determines the dataflow paths based on what it learns about traffic characteristics, network topology, and resource information over the entire domain.

To configure QOSPF extensions, refer to "Guidelines for Configuring IP Multicasting and Multimedia Services" on page -22 and *Configuring IP Multicasting and Multimedia Services*.

New DVMRP Features

The new features for DVMRP include

- Default route, including route listening, propagation, and generation.
- An interface to the Multicast Table Manager (MTM), which facilitates multicast data forwarding.
- Interaction with the MOSPF protocol. To configure the new DVMRP features, refer to "Guidelines for Configuring IP Multicasting and Multimedia Services" on page -22 and *Configuring IP Multicasting and Multimedia Services*.
- Announce policies.

Multicasting Tools

The following multicast tools are available for troubleshooting various types of multicast networks:

- **mrinfo** displays the capabilities of a DVMRP multicast router, indicates whether it supports mtrace and pruning, and shows revision information. It also shows the link characteristics for every link on the router.
- **mtrace** traces multicast branches and displays statistics about packet rates and losses for each hop along the path.

See Appendix B of *Configuring IP Multicasting and Multimedia Services*.

RSVP

The Resource Reservation Protocol (RSVP) allows host systems in an IP network to reserve resources on RSVP-capable routers for unicast and multicast dataflows. A dataflow is a transmission of packets requiring a certain quality of service (QoS) from one or more sources to one or more destinations. BayRS Version 12.00

- Supports RSVP as described in RFC 2205, *Resource ReSerVation Protocol (RSVP) -- Version 1 Functional Specification*
- Includes the Circuit Resource Manager (CRM) for support of RSVP
- Interfaces to both unicast and multicast routing

To configure RSVP, refer to "Guidelines for Configuring IP Multicasting and Multimedia Services" on page -22 and *Configuring IP Multicasting and Multimedia Services*

MTM

Multicast Table Manager (MTM) is an application that manages multicast protocols, executes the Internet Group Management Protocol (IGMP), maintains a multicast forwarding cache, and forwards multicast traffic. MTM also supports static multicast forwarding policies. IGMP supports accept policies.

To configure MTM and IGMP, refer to

- "Guidelines for Configuring IP Multicasting and Multimedia Services" on page -22
- *Configuring IP Multicasting and Multimedia Services*

- *Release Notes for Site Manager Software Version 6.00* to configure the IGMP and MTM policy filter parameters

IPv6

Internet Protocol Version 6 (IPv6) supports large hierarchical addresses, expanding to 128 bits. IPv6 also includes support for RIP (including accept and announce policies), Neighbor Discovery, and traffic filters. To configure IPv6, refer to

- "Configuring IPv6" on page -20
- *Release Notes for Site Manager Software Version 6.00*
- *Configuring IPv6 Services*

IPv6 PPP Control Protocol

IPv6 PPP Control Protocol (CP) lets IPv6 operate over leased PPP lines. Using this protocol, IPv6 negotiates for interface tokens to form link-local addresses. This protocol supports agreement or disagreement between PPP peers as to whether they can exchange IPv6 datagrams over the PPP link. To enable this protocol, refer to *Configuring PPP Services*.

ISP Mode

Internet Service Provider mode comprises features that make a router more efficient in an Internet service provider environment. These features include BGP soloist (BGP running on only one slot on a router), cache elimination, and memory allocation suitable for accommodating large routing tables. To configure ISP mode, refer to *Configuring IP Services*.

Network Address Translation (NAT)

NAT maps a local, unregistered source IP address in an outgoing packet to a registered address recognizable by the rest of the network world. The mapping enables two or more networks to communicate without changing IP addresses in their own networks, even if there are duplicate IP addresses across the networks. The mapping occurs dynamically. To configure NAT, refer to *Configuring IP Services*.

NAT does not support FTP applications.

X.25 Gateway and X.25 PVCs

Version 12.00 supports X.25 PVCs for X.25 Gateway services only.

X.25 Gateway provides connectivity between X.25-based terminal users and applications running on TCP/IP-based hosts. Using this software, a router translates data received from X.25 virtual connections into TCP data and forwards it through TCP connections and vice versa. The terminals may be connected to the router by a leased line, an X.25 packet-switched network, or a T1/E1-based circuit-switched network. An X.25 permanent virtual circuit (PVC) is a permanent translation stream that remains up until one peer terminates it, or X.25 resets or restarts. PVCs are a standard feature of X.25 software.

Asynch over TCP

The Asynch over TCP (AOT) software routes asynchronous traffic polled from alarm hosts to alarm devices over a TCP/IP backbone. It is also called the Polled Asynch Protocol (PAS) or Asynch Passthru over TCP. This software runs on the following platforms and I/O modules:

- ASN™ -- Dual Sync net module and Quad Sync net module
- AN®
- ARN™
- BN® -- Octal Sync link module

Router Redundancy

Router redundancy now includes an attribute, *wfRRedundWarmBoot*, in the *wfRRedundGroup* object that allows router redundancy to operate among routers running BayRS Version 11.01 and later, or 11.00 and earlier. This attribute is accessible only via the Technician Interface.

Caution: Use the same *wfRRedundWarmBoot* setting for all routers in a router redundancy group.

If all of the routers in a router redundancy group are running Version 11.01 and later, use the default setting, disabled, to allow a router in the group to perform a role switch without rebooting.

If the routers in a router redundancy group are running Version 11.01 or later, and Version 11.00 or earlier, a router in the group must reboot to perform a role switch. Enter the following Technician Interface command to enable booting for every router in the group:

set wfRRedundGroup.31.0 <*value*>**;commit**

31 represents the *wfRRedundWarmBoot* attribute.

0 represents the router instance.

value is **1** (enabled) or **2** (disabled).

Frame Relay Traffic Shaping

Frame relay traffic shaping provides a more flexible mechanism to control congestion per VC than our former method, which dropped traffic destined for a PVC where there was congestion.

Traffic shaping provides the ability to *throttle* (queue) congested traffic rather than drop it, or to throttle congested traffic, and then shut down the VC if congestion continues. Committed information rate (CIR) enforcement and quality of service (QoS) determine how traffic shaping works.

The CIR is the rate at which the network supports data transfer under normal conditions; you negotiate this value with your carrier. You can configure frame relay to restrict the speed of outbound traffic to a rate no faster than the CIR, and this is called CIR enforcement. You can also manipulate several variables to send data faster than the CIR when there is no congestion.

QoS adds protocol prioritization to traffic shaping. This creates two types of queues for outbound traffic, with shaped traffic having a higher priority than normal traffic.

For instructions on configuring traffic shaping, refer to *Configuring Frame Relay Services*.

SRB over ATM PVCs

The Source Route Bridge (SRB) protocol over ATM permanent virtual circuits (PVCs) enables frame relay to more readily interoperate with ATM (by running SRB in the ATM WAN network). You can configure the same SRB parameters available for frame relay and token ring (in both standard SRB and Bay Networks proprietary formats).

BaySecure FireWall-1

BaySecure™ FireWall-1 integrates Version 2.1 of Check Point Software Technologies Ltd™ FireWall-1™ software, with the exception of user authentication, address translation, statistics, and encryption features, into the Bay Networks GAME router operating system. Through this integration, Bay Networks routers provide fully secure, bidirectional, anti-spoofing communication for all Internet applications and services, such as FTP, Telnet, and SMTP.

BaySecure FireWall-1 supports the following interfaces:

- Wellfleet Standard
- Frame relay (group mode only)
- Ethernet

For instructions, refer to "Configuring and Managing BaySecure FireWall-1" on page -28 and *Configuring BaySecure Firewall-1*.

DVMRP Cache Command

The Technician Interface **ip dvmrp_caches -s** command obtains DVMRP routing caches for the slot you specify. This command replaces the **ip cache -M** command. For more information about this and other changes to the **ip** command, refer to *Using Technician Interface Software*.

Support for HSSI Net Module in the ASN and System 5000

Version 12.00 supports the Single HSSI net module (SHSSINM 3584), including loopback testing, on the ASN and System 5000. For instructions, refer to

- "Using the HSSI Net Module in a Stand-Alone ASN" on page -16
- *Installing a HSSI Net Module in an ASN Platform* or *Installing a HSSI Net Module in a System 5000*
- *Configuring WAN Line Services*

New Guidelines for Working with Version 12.00

Note the following new guidelines when using Version 12.00. They supplement the instructions in the 12.00 documentation set.

Upgrading Routers from Version 7-11.xx to Version 12.00

The following sections correct the instructions in *Upgrading Routers from Version 7-11.xx to Version 12.00*.

Locating the BCC Help File on the CD

The first paragraph under "Using the BCC Help File" on page 2-9 of *Upgrading Routers from Version 7-11.xx to Version 12.00* incorrectly states that the *bcc.help* file is in the *rel* directory of the upgrade CD. It is actually named *bcc_help*, and it is in the same directory as the boot image in the upgrade CD.

Renaming the BCC Help File after Loading the Router Software onto a PC

After following the instructions in "Loading the Router Software onto a PC" on page 3-7 of *Upgrading Routers from Version 7-11.xx to Version 12.00*, rename the *bcc_help* file to *bcc.help*.

Using the BCC

Before Using the BCC

The BCC is a command-line interface for configuring Bay Networks devices. It also supports Technician Interface commands and scripts.

Before using the BCC, refer to the following sections listing the platforms, protocols, and interfaces that the BCC supports.

Platforms Supported

The BCC runs on AN, ANH[1], and BN platforms including both ARE[2] and FRE® processor cards. Each slot must have

- 8 MB of dynamic RAM (DRAM)
- 1.5 MB of free memory space

If you try to start the BCC with insufficient DRAM or free memory on a slot, the BCC returns an error message. In that case, use Site Manager instead of the BCC.

Global Protocols Supported

You can use BCC commands to configure the following global protocols:

BCC supports the following

- IP (including access policies and static routes)
- ARP
- OSPF (including accept and announce policies)
- BGP (including accept and announce policies)
- IGMP
- RIP (including accept and announce policies)
- Telnet

1. You cannot use BCC commands to configure the operation of any ISDN, DCM, or CSU/DSU daughterboard in an AN or ANH device. (Use Site Manager to configure these daughterboards.)
2. The BCC runs on ARE processor cards to let you configure the protocols and interfaces listed in this section. However, the BCC does not support ATM.

- TFTP
- FTP
- NTP
- SNMP

Interface Protocols Supported

You can use BCC commands to configure the following interface protocols:

- IP
- ARP
- IGMP
- RIP
- OSPF
- Router Discovery (RDISC)
- Proprietary Standard Point-to-Point
- PPP (certain line parameters only)

  Refer to *Configuring PPP Services* for details.

Interfaces Supported

You can use BCC commands to configure the following interfaces:

- Console
- Ethernet
- Token ring
- Synchronous
- FDDI
- HSSI
- Virtual

Tables 1 and 2 on pages -13 and -14 list the link and net modules BCC supports.

Getting Started

Caution: BCC configuration and **source** commands make immediate changes to the active device configuration. Read about the **source** command in *Using the Bay Command Console (AN/BN Routers)*.

Before using the BCC, we recommend that you save your configuration files by copying them onto the same Flash memory card using new file names.

To start BCC, enter **bcc** at the Technician Interface prompt of a Model AN, ANH, BCN®, or BLN® router.

Enter **help learning-bcc** at the bcc> prompt to display the online instructions for new BCC users. Then enter **help -more** to display a full summary of the Help-oriented features of the BCC interface.

For more general information about how to use the BCC interface, refer to *Using the Bay Command Console (AN/BN Routers)*.

For instructions on using the BCC to add and customize specific services, refer to the appropriate customizing services guide.

Configuring BCC

This section supplements the instructions in *Using the Bay Command Console (AN/BN Routers)*

Only one BCC session can be active at a time.

If you use the BCC **show config** command to view a router's configuration, BCC displays only the protocols it supports. Before using the BCC to delete an interface, make sure that you did not use Site Manager to configure it with an unsupported protocol. If you did, use Site Manager to delete the interface.

Identifying Board Types

This section supplements the instructions in the documentation set.

Tables 1 and 2 identify the Board Type parameter values displayed by BCC. Use the "Board Type" column to identify a hardware module in an AN or BN router configuration.

Table 1 lists the AN and ANH board types.

Note: You can use BCC commands to configure any AN or ANH device, but note the following exception: You cannot use BCC commands to configure the operation of any ISDN, DCM, or CSU/DSU daughterboard in an AN or ANH device. (Use Site Manager to configure these daughterboards.) Inserting a daughterboard into an AN base module redefines its module ID and board type.

Table 1. BCC Board Types: AN and ANH Modules

BCC Board Type	Technician Interface or MIB Module ID	Description
andeds	1033	AN-ENET (2 Ethernet ports, 2 sync ports) with 8 MB or 16 MB DRAM
andedsg	1050	ANH-8 (2 Ethernet ports, 2 sync ports) with 8 MB or 16 MB DRAM and an 8-port Ethernet hub active for the first Ethernet port
andedsh	1035	ANH-12 (2 Ethernet ports, 2 sync ports) with 8 MB or 16 MB DRAM and a 12-port Ethernet hub
andedst	1034	AN-ENET (2 Ethernet ports, 2 sync ports, 1 token ring port) with 8 MB or 16 MB DRAM
andst	1037	AN-TOKEN (2 sync ports, 1 token ring port) with 8 MB or 16 MB DRAM
ansdsedst	1041	AN-ENET/TOKEN (1 Ethernet port, 2 sync ports, 1 token ring port) with 8 MB or 16 MB DRAM
anseds	1024	AN-ENET (1 Ethernet port, 2 sync ports) with 8 MB or 16 MB DRAM
ansedsg	1047	ANH-8 (1 Ethernet port, 2 sync ports) with 8 MB or 16 MB DRAM and an 8-port Ethernet hub
ansedsh	1026	ANH-12 (1 Ethernet port, 2 sync ports) with 8 MB or 16 MB DRAM and a 12-port Ethernet hub
ansedst	1025	AN-ENET/TOKEN (1 Ethernet port, 2 sync ports, 1 token ring port) with 8 MB or 16 MB DRAM

(continued)

Table 1. BCC Board Types: AN and ANH Modules *(continued)*

BCC Board Type	Technician Interface or MIB Module ID	Description
ansets	1030	AN-ENET (1 Ethernet port, 3 sync ports) with 8 MB or 16 MB DRAM
ansetsg	1049	ANH-8 (1 Ethernet port, 3 sync ports) with 8 MB or 16 MB DRAM and an 8-port Ethernet hub
ansetsh	1032	ANH-12 (1 Ethernet port, 3 sync ports) with 8 MB or 16 MB DRAM and a 12-port Ethernet hub
ansetst	1031	AN-ETS (1 Ethernet port, 3 sync ports, 1 token ring port) with 8 MB or 16 MB DRAM
antst	1039	AN-TOKEN (3 sync ports, 1 token ring port) with 8 MB or 16 MB DRAM

Table 2 lists the BLN and BCN board types.

Table 2. BCC Board Types: BLN and BCN Modules

BCC Board Type	Technician Interface or MIB Module ID	Site Manager Model Number	Description
comp	4353	AG2104037	Octal Sync with 32-context compression daughterboard
comp128	4354	AG2104038	Octal Sync with 128-context compression daughterboard
de100	4864	50038	100BASE-T Ethernet
dst416	40	5740	Dual Sync with token ring
dtok	176	5710	Dual token ring
enet3	132	5505	Dual Ethernet
esaf	236	5531	Dual Sync Dual Ethernet with 2-CAM filters
		5532	Dual Sync Dual Ethernet with 6-CAM filters
esafnf	232	5431	Dual Sync Dual Ethernet without hardware filters
osync	4352	5008	Octal Sync

(continued)

Table 2. BCC Board Types: BLN and BCN Modules *(continued)*

BCC Board Type	Technician Interface or MIB Module ID	Site Manager Model Number	Description
qef	164	5950	Quad Ethernet with hardware filters
qenf	162	5450	Quad Ethernet without hardware filters
qtok	256	50021	Quad token ring
shssi	225	5295	HSSI
sse	118	5410	Single Sync with Ethernet
sync	80	5280	Quad Sync
wffddi1m	193	5943	Hybrid FDDI with single mode on connector B
wffddi1mf	197	5949	Hybrid FDDI with single mode on connector B, and with hardware filters
wffddi1s	195	5942	Hybrid FDDI with single mode on connector A
wffddi1sf	199	5948	Hybrid FDDI with single mode on connector A, and with hardware filters
wffddi2m	192	5930	Multimode FDDI
wffddi2mf	196	5946	Multimode FDDI with hardware filters
wffddi2s	194	5940	Single Mode FDDI
wffddi2sf	198	5947	Single Mode FDDI with hardware filters

Sending BCC Feedback

After you use the BCC, we welcome your feedback. Please visit the BCC Web Site at the following URL, where you can leave us a message:

http://support.baynetworks.com/library/tpubs/bccfeedbk

Using the HSSI Net Module in a Stand-Alone ASN

Because a stand-alone (non-stacked) ASN has a single CPU, multiple high-speed interfaces place a high load on it.

You can use the HSSI net module with other high-speed interfaces, such as the FDDI and/or 100BASE-T, in a stand-alone ASN. However, if you configure a HSSI net module to achieve T3 or OC-1 speeds, the forwarding performance is limited, especially with other high-speed interfaces in the same chassis.

Figure 1 shows two ASNs, each with a FDDI and HSSI net module, passing traffic bidirectionally.

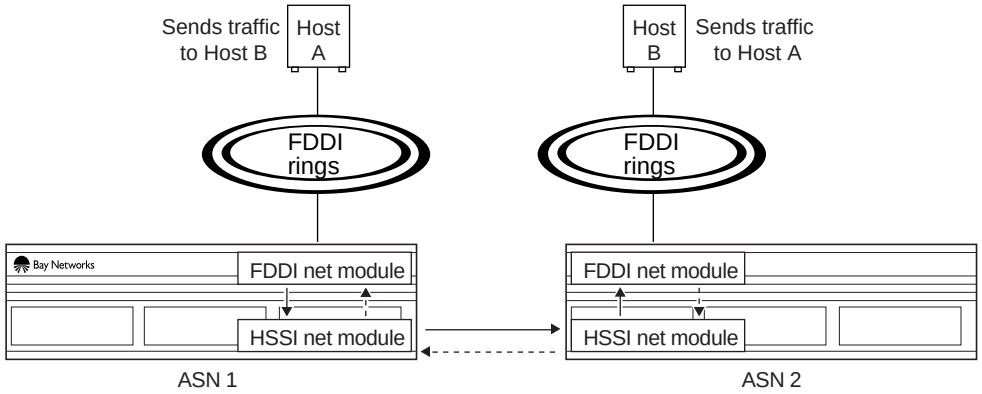

Figure 1. HSSI Net Module Test in Stand-Alone ASNs

Table 3 shows the bandwidth capacity of the HSSI link between the two ASNs in Figure 1.

Table 3. HSSI Net Module Bandwidth Capacity

WAN Protocol	Direct or Group	PVCs or Circuits	Packet Size	Maximum Packets Per Second Without Loss	Effective Throughput
Frame Relay	direct	1	64	9500	4.86 Mb
		50	64	5000	2.56 Mb
		1	512	6500	26.62 Mb
		50	512	5000	20.48 Mb
	group	1	64	9500	4.86 Mb
		50	64	6000	3.07 Mb
		1	512	7000	28.67 Mb
		50	512	5500	22.53 Mb
PPP	NA	1	64	18,300	9.37 Mb
	NA	1	512	11,000	45.06 Mb
Wellfleet Standard	NA	1	64	18,200	9.32 Mb
	NA	1	512	10,800	44.24 Mb

Editing Line Resources on an MCT1 Circuit

To edit line resources on an MCT1 circuit do the following:

1. **Click on the MCT1 circuit in the configuration manager window.**

   The MCT1 Logical Lines window appears.

2. **Click on the logical line.**
3. **Scroll to the bottom of the MCT1 Logical Lines window.**
4. **Select Line Resources.**
5. **Click the Values button.**

   The Line Resources window appears.

Corrections to *Configuring PPP Services*

The following sections identify corrections to *Configuring PPP Services*.

Configuring PPP over Dial-up Lines

The check mark in the BCC column next to "Run PPP over dial-up lines" in the table on Page 1-2 of *Configuring PPP Services* is incorrect. You must use Site Manager to configure PPP over dial-up lines.

Using the BCC to Start PPP Services

The following instructions replace those in "Using the BCC" on page 1-4 of *Configuring PPP Services*:

To enable IP routing on a given interface, navigate to the IP prompt by entering the commands shown in bold in the following sequence.

1. **Specify the physical interface on which to enable IP routing.**

   box# *<connection_type>* **slot** *<slot_no.>* **connector** *<connector_no.>*

   Connection_type can be **sync** or **hssi**.

   Slot_no. and *connector_no.* indicate the slot number and connection number on which to enable IP routing; for example,

   box# **sync slot 3 connector 1**

2. **Configure PPP on this interface.**

   sync/3/1# **ppp**

3. **Configure the IP address and mask for this interface.**

   ppp/3/1# **ip address** *<IP_address>* **mask** *<subnet_mask>*

   For example, the following command assigns an IP address of 1.1.1.1 with a standard Class C mask.

   ppp/3/1# **ip address 1.1.1.1 mask 255.255.255.0**

   When you configure the IP address and subnet mask, the router automatically enables IP services.

Using the BCC to Enable PPP on an Interface

The prompt is incomplete in the example under "Using the BCC" on page 3-3 of *Configuring PPP Services*. The prompt in the following sample command is correct:

`ip/1.1.1.1/255.255.255.0#` **state enable**

Using the BCC to Disable a Network Control Protocol

The prompt is incomplete in the example under "Using the BCC" on page 3-14 of *Configuring PPP Services*. The prompt in the following sample command is correct:

`ip/1.1.1.1/255.255.255.0#` **state enable**

Using the BCC to Force LCP Renegotiation

To force LCP renegotiation on a given line, enter the commands shown in bold in the following sequence.

1. **Specify the physical line on which to force LCP renegotiation.**

   `box#` *<connection_type>* **slot** *<slot_no.>* **connector** *<connector_no.>*

   Connection_type can be **sync** or **hssi**.

   Slot_no. and *connector_no.* indicate the slot number and connection number; for example,

   `box#` **sync slot 3 connector 1**

2. **Disable the line.**

   `sync/3/1#` **state disable**

3. **Reenable the line.**

   `sync/3/1#` **state enable**

Adding X.25 Logical Lines and X.25 Service Entries

If you use dynamic mode to add an X.25 logical line or add an X.25 service entry, save the changes to the configuration file on the Flash memory card and boot the router for the changes to take effect.

Configuring IPv6

This description supplements those in *Configuring IPv6 Services*.

Version 12.00 does not support

- BCC configuration of IPv6

  Use Site Manager to configure IPv6.
- IPv6 over frame relay or X.25 PDN
- IPv6 over hashed source/destination multiline

  Use the round robin option.
- IPv6 over PPP on VME platforms
- Priority queueing of IPv6 traffic

Caution: Set the RIP diameter of every IPv6 interface on the router to the same value. Use Site Manager to set the RIP diameter. See *Configuring IPv6 Services*, "Specifying the RIPv6 Diameter."

The following parameter descriptions provide more information than the Site Manager parameter online Help and pages A-4 and A-5 of *Configuring IPv6 Services*.

Parameter: Interface Token

Path: Configuration Manager > Protocols > IPv6 > Edit IPv6 Interfaces

Default: See Instructions.

Options: A portion of an IPv6 address, consisting of 0 to 32 hexadecimal characters, delimited with a colon (:) every four hexadecimal characters.

Function: Supplies an identifier (an interface token) for this interface that is unique on the link to which this interface is attached. The interface token is combined with an address prefix to form an interface address.

Instructions: If you do not configure a token, the router automatically configures it according to the rules of the link type to which this interface is attached. For most media, this involves mapping the link layer (or MAC) address, X.121 address, or other system unique value (e.g. serial number) to a 64-byte value. (For example, MAC Address 00-00-a2-11-22-33 maps to IPv6 Token Address 0200:a2ff:fe11:2233).

MIB Object ID: 1.3.6.1.4.1.18.3.5.3.16.1.1.2.1.7

Parameter: Circuit Name

Path: Configuration Manager > Protocols > IPv6 > Edit IPv6 Interfaces

Default: The name of the circuit on which you have configured the IPv6 interface

Options: A valid circuit name

Function: Identifies the circuit that the interface runs over.

Zero indicates that this is a tunnel end point. In IPv6 tunneling, IPv6 packets are encapsulated and transmitted by another network layer protocol or another instance of the IPv6 protocol. A value of 1023 or greater indicates a circuitless or software loopback, IPv6 interface.

Instructions: Supply a value that identifies this circuit.

MIB Object ID: 1.3.6.1.4.1.18.3.5.3.16.1.1.2.1.6

Parameter: Link Layer Address

Path: Configuration Manager > Protocols > IPv6 > Edit IPv6 Interfaces

Default: None

Options: A valid link layer address

Function: Specifies the link layer or Layer 2 frame address for this IPv6 interface

Instructions: Supply a link layer address in the correct format. For Ethernet, FDDI, or token ring, the link layer address is a 48-bit IEEE 802.3 media access control (MAC) address.

MIB Object ID: 1.3.6.1.4.1.18.3.5.3.16.1.1.2.1.11

Parameter: Slot Mask

Path: Configuration Manager > Protocols > IPv6 > Edit IPv6 Interfaces

Default: 4294705152

Options: All slots

Function: Specifies which slots a circuitless interface is eligible to run on.

Instructions: Select one or more slots as candidates to run this circuitless IPv6 interface. This parameter is relevant only if the Circuit Name parameter for this IPv6 interface is set to a value greater than 1023.

MIB Object ID: 1.3.6.1.4.1.18.3.5.3.16.1.1.2.1.15

Guidelines for Configuring IP Multicasting and Multimedia Services

The following guidelines supplement the instructions in *Configuring IP Multicasting and Multimedia Services*.

Configuring MOSPF, QOSPF, and DVMRP

Version 12.00 does not support dynamic configuration of MOSPF/QOSPF. After making local configuration changes, restart OSPF by disabling and reenabling it.

Version 12.00 QOSPF supports inter-area and intra-area multicast only with RSVP FF reservation style.

If you enable MOSPF, do not run other multicasting protocols on any OSPF interfaces, even if MOSPF is disabled on those interfaces (that is, even if you set the Multicast Forwarding parameter to blocked).

If you want to disable MOSPF on a network, use Site Manager to disable MOSPF on all routers in the network. See *Configuring IP Multicasting and Multimedia Services*, "Configuring Multicast Forwarding on an OSPF Interface."

If you are configuring a network with both MOSPF and non-MOSPF routers, set all non-MOSPF routers to priority 0 so that the MOSPF routers can become DR/BDR, which is necessary for MOSPF to work.

If the network contains any routers running versions earlier than 12.00, and you configure a Version 12.00 router to advertise DVMRP routes into an MOSPF domain, configure it to originate AS external link advertisements for both unicast and multicast routes (that is, use the same entry point for both external unicast and external multicast routes).

Version 12.00 supports only the ignore action of the DVMRP announce route policy. It does not support a DVMRP accept route policy.

Version 12.00 does not support an MOSPF accept route policy. Use the MOSPF announce route policy to import DVMRP routes as multicast ASE routes. When connecting an MOSPF domain to an MBONE implementation via a DVMRP, keep the OSPF database small by configuring the MOSPF route announce policy to import only the default DVMRP route to the MOSPF domain.

Note: Refer to the *Release Notes for Site Manager Software Version 6.00* to configure the DVMRP, MOSPF, IGMP, and MTM policy filter parameters.

We recommend that you avoid using MOSPF in a transit domain for multicast.

The router will time out an MOSPF forwarding entry a certain time after it receives the last packet in the flow. The default timeout value is 600 seconds. You can change this value by setting the Timeout Value parameter. To access this parameter, begin at the Configuration Manager window, and click on Protocols, IP, OSPF, and Global. If most flows are short-lived, set the value to a number that slightly exceeds the interval between two packets of the same flow. For example, if you expect the longest interval between two packets for a flow to be 1 minute, set the timeout value to 90 seconds. Setting the value below the interval is OK but it does cause unnecessary Dykstra.

Monitoring MOSPF

On a router running both MOSPF and DVMRP, the following values indicate an external upstream interface (that is, a DVMRP interface):

- The `Upstream Interface` value `255.255.255.254` appears when you enter the Technician Interface **show mospf fwd** command.
- The `in` value `-2` appears when you enter the Technician Interface **ip mospf_fwd** command.

Monitoring DVMRP

The dvmrp.bat script has changed as follows because DVMRP no longer forwards data:

- The Technician Interface does not display In Drops and Out Drops statistics in response to the **show dvmrp stats circuits** command.
- The Technician Interface does not display In Packets, Out Packets, Ip Drop, Out Drop, and Thrshld Drop statistics in response to the **show dvmrp stats vifs** command.

Configuring the Expanding Ring Search

The support for Expanding Ring Search in MOSPF is disabled by default for better performance. You can use Site Manager to enable it. See *Configuring IP Multicasting and Multimedia Services*, "Enabling Dynamic TTL."

Configuring Administratively Scoped Multicast

Packets with administratively scoped multicast addresses are locally assigned, and are not required to be unique across administrative boundaries because they do not cross them. Refer to the Internet Draft *Administratively Scoped IP Multicast* (draft-ietf-mboned-admin-ip-space-03.txt) for details.

Version 12.00 does not support the dynamic configuration of administratively scoped multicast. Site Manager also does not support it. Use the Technician Interface to configure it via the wfIgmpBoundaryEntry MIB object.

Configuring the Static Forwarding Entry

Version 12.00 does not support the dynamic configuration of the multicast Static Forwarding Entry. Refer to "MTM Static Forwarding Policy Parameters" in the *Release Notes for Site Manager Software Version 6.00* to control the forwarding of multicast packets.

Static forwarding entries statically determine how the router forwards particular multicast flows. You can not use both static and dynamic (via multicast protocols) forwarding. For example, you can not configure a static forwarding entry to specify that for a particular source/group pair, the router accept packets on Circuit 1, forward them out Circuits 2 and 3, but rely on a multicast protocol to dynamically decide if those packets should be forwarded out Circuit 4.

Configuring the DVMRP Prune Lifetime

By default, DVMRP sets a lifetime of 7200 seconds on the prune messages it sends out an interface. You can use Site Manager to specify a lifetime between 0 and 86,400 seconds.

Beginning at the Configuration Manager window, click on Protocols and IP. The IP protocol menu appears. Click on Multicast, DVMRP, and Circuit. The DVMRP circuit window opens. Set the Prune Life Time parameter and click on Done.

Configuring Multicasting Policies

You can use Site Manager to configure routing policies for DVMRP, MOSPF, IGMP, and MTM.

Beginning at the Configuration Manager, click on Protocol and IP. The IP protocol menu appears. Click on Policy Filters and select the multicasting protocol for which you want to configure a policy. A protocol-specific window for the policy opens. Set the parameters to define the policy and click on Done.

Enabling BAP for Bandwidth-on-Demand Service

The procedures for enabling the bandwidth allocation protocol (BAP) and the names of the BAP parameters changed after the publication of *Configuring Dial Services*.

BAP is no longer an option on the Select Protocols menu. The BAP parameters, Enable BAP and BAP No Phone Number Needed, are in

- The Bandwidth On Demand Monitor Options window.

  To open this window, refer to "Monitoring Congestion on the Bandwidth or Demand Circuit" in Chapter 11 of *Configuring Dial Services.*

- The BOD Configuration window for demand circuits.

  To open this window, refer to "Adding Bandwidth Service for Demand Lines" in Chapter 1 of *Configuring Dial Services.*

For BAP parameter descriptions, refer to Appendix A of *Configuring Dial Services*. The parameter names in the appendix are Enable and No Phone Number Needed.

Corrections to *Configuring and Managing Routers with Site Manager*

Note the following corrections to *Configuring and Managing Routers with Site Manager*:

- On page 6-8, the text that follows step 5 should read:

  The directory and file name that you specify depend on the following:

  - The computer platform (UNIX workstation or PC)
  - The type of router

  If you loaded BayRS onto a UNIX workstation, the image is in the directory for the type of router. For example, the image *bn.exe* for the BN router is in the directory for the BN.

  If you loaded BayRS onto a PC, the image is in the directory you created for the image, for example, *\wf\xxx.*

- On page 6-14, disregard the first two sentences of the third paragraph, which read:

  You may want to save the image in the same directory in which you loaded BayRS. (Refer to "Loading Image Files into the Image Builder" on page 6-7.)

Stabilizing Frame Relay PVCs for Dial-up Connections

The following guidelines supplement the instructions in *Configuring Dial Services*.

Delaying the transmission of data traffic from a dial-up connection to a primary PVC gives the primary PVC time to stabilize in a frame relay network. Stabilizing the PVC increases the reliability of dial-up connections. The configuration is available only via the Technician Interface.

Enter the following command to display each instance:

list instances wfFrVCircuitEntry

The Technician Interfaces displays the instances in the format <*wfFrCircuitLineNumber*>.<*wfFrCircuitLLIndex*>.<*wfFrCircuitDlci*>.

Enter the following command for each instance:

set wfFrVCircuitEntry.53.*<instance> <delay>***;commit**

53 represents the attribute named wfFrCircuitStartupDelay.

<instance> is the wfFrCircuitLineNumber.wfFrCircuitLLIndex.wfFrCircuitDlci character string.

<delay> is the number of seconds the router waits before it sends data to the PVC. The default value is 0, indicating that the VC becomes activate immediately. Set the value to how long you believe the network needs to be stabilized. Typically, it is how long it takes for the status to match at both ends of the network. If you are concerned that the PVC may come down before the next full status inquiry, set the value to exceed

your polling interval * the full-inquiry interval

For example, if your polling interval is the default value 10, and the full-inquiry interval is the default value 6, set the *<delay>* to exceed 60.

Configuring OSPF on ARN routers

If you use the Technician Interface quick-start script (inst_arn.bat) to configure a second IP interface with OSPF as the routing protocol on another serial interface on an ARN router, the script prompts you for an OSPF router ID, and displays the IP address you are configuring as the default address. Do not accept it. You already entered an OSPF router ID for the initial serial interface. Because this prompt is for a global address, assign the same router ID address to the second serial interface.

Configuring and Managing BaySecure FireWall-1

The following guidelines supplement the instructions in *Configuring BaySecure FireWall-1*.

Configuring FireWall-1

For proper firewall operation, perform these steps:

1. **Enable TCP on all slots on the router.**
2. **Create an instance of a firewall using Site Manager:**
   a. **Configure a local host and log host IP address on the router.**
   b. **Enable FireWall-1 on all interfaces.**
3. **Create a static route if the router and firewall management stations are on different subnets.**
4. **Reboot the router with a firewall configuration file.**
5. **Synchronize the router and management station passwords by executing the fwputkey command on both the router and the firewall management station.**
6. **Define a security policy and add a network object for the router using the FireWall-1 GUI.**
7. **Save the configuration and boot the router.**
8. **Install the security policy on the router.**

If you have performed these steps and still have system problems, contact the Bay Networks Technical Solutions Center.

Responding to Management Software Version Error When Installing a Firewall-1 GUI Client Security Policy

If the Firewall-1 GUI Client displays a message stating the management software is 2.x, not 3.0, follow these instructions to install the X/Motif GUI client:

Note: This FireWall-1 GUI client is not available for SunOS platforms.

1. **Log in as root.**
2. **Mount the CD and extract the tar files, as follows:**

   cd /tmp
   tar xvf /cdrom/*<o_s>***/gui-clnt/fwgui.***<tarfile_name>****.tar**
3. **Run the installation script:**

   ./fwguiinstall

   The following shows a sample installation. The user input is in **bold**. When the script displays the thank you message, continue with the instructions on page -30.

```
******FireWall-1 GUI client v3.0 Installation*******

please wait .....

Selecting FireWall-1 GUI client base directory

-----------------------------------------------

FireWall-1 GUI client requires approximately 26890 KB of free disk
space.

The FireWall-1 GUI client will be extracted into two subdirectories
('bin' and 'clients') of the base directory

Enter base directory [/etc/fw]):[RETURN]

Checking disk space availability...

Installing FW under /etc/fw (244651 KB free)

Are you sure (y/n) [y] ?[RETURN]

Software distribution extraction

-------------------------------

Extracting software distribution. Please wait ...

Software Distribution Extracted to /etc/fw
```

```
********** FireWall-1 GUI client Setup **************

FireWall-1 GUI client access and execution permissions

-----------------------------------------

Usually, FireWall-1 GUI client is given group permission for access
and execution.

You may now name such a group or instruct the installation procedure
to give no group permissions to FireWall-1 GUI client.
In the latter case, only you will be able to access and execute
FireWall-1 GUI client.

Please specify group name [<RET> for no group permissions]: other
Group other will be used. Is this ok (y/n) [y] ?[Y]

Setting Group Permissions...

*****************************************************

                Thank you for using FW-1

To run the clients use /etc/fw/bin/{fwpolicy, fwlog, fwstatus}

*****************************************************
```

4. **Run the GUI:**

   # wfpolicy

5. **Enter your user id and password, and the management station that you want to connect to.**

Responding to Check Point FireWall-1 Errors

The Check Point FireWall-1 software may report the following errors. Follow the instructions provided for resolving these errors.

Error: **Installing Security Policy nologs_fast.pf on all.all@BLN73 (Bay Networks). Authentication for command bload failed. Failed to Install Security Policy on BLN73: Unauthorized action**

Meaning: The router and management station passwords are no longer synchronized because either a configuration change involved the log host or local host IP addresses, or the FRE module was swapped out since the **putkey** command was last executed.

Action: Use the **putkey** command on both the router and the firewall management station to synchronize the passwords. Once you resolve this error, other configuration errors may appear.

Error: **Installing Security Policy nologs_fast.pf on all.all@BLN73 (Bay Networks). bload: connect(BLN73): Connection refused. Failed to Install Security Policy on BLN73: Connection refused**

Meaning: The firewall management station and the router cannot establish a channel of communication because either RFWALLC is not initialized or TCP is not enabled on the slot where the network link module is located, or the router is pointing to an incorrect log host IP address.

Action: Load TCP onto the slot where the network link module is located, and verify that the log host IP address is correct. As long as you enable TCP on all slots and a physical connection to the management station exists, communication should be continuous.

Otherwise, you can force FWALLC to initialize on the slot where the network link module is located, and verify that the log host IP address is correct. To force FWALLC to initialize on a particular slot, place the flash card that contains the configuration file in the desired slot. However, if the slot goes down or is bounced, RFWALLC will be forced onto another slot, and all communication with the management station will be lost unless you have configured an alternate route to the management station for a link module residing on the new slot.

We suggest using circuitless IP to avoid the need for FWALLC to reside on a particular slot.

Error: **Installing Security Policy nologs_fast.pf on all.all@BLN73 (Bay Networks). Version 3.0 cannot load security policy on 192.168.135.79 because it is an earlier release (2.x). You must upgrade the FireWall-1 software there in order to be able to manage it from version 3.0 management station. Authentication for command bload failed. Failed to Install Security Policy on BLN73: Unauthorized action**

Meaning: This error occurs when the local host IP address is not set to the firewalled router's address. Although the error mentions an authentication problem, this is not necessarily the case. The router and management station may be synchronized.

Action: Set the local host IP address to the firewalled router's address, save the configuration, and reboot the router.

If the Log Host IP Address parameter is not set to the IP address of the management station, the policy may still get installed but the router will not attempt to send log information back to the management station.

Configuring OSI Services: X.25 PVCs

The SNPA (Subnetwork Point of Attachment) parameter in the External Address Adjacency Configuration and External Address Adjacency List window now supports X.25 permanent virtual circuits (PVCs). See the following parameter description:

Parameter: SNPA

Path: None

Default: An empty list

Options: Depends on the circuit type (see below)

Function: Specifies an SNPA for the adjacent end system

Instructions: Enter the SNPA for the adjacent end system as follows:

- If this circuit is an X.25 PDN circuit and connects to an X.25 switched virtual circuit (SVC), then enter a valid X.121 address for the remote router in decimal format.
- If this circuit uses PPP, then leave this field blank.

MIB Object ID: 1.3.6.1.4.1.18.3.5.6.4.1.16

Note: Version 12.00 PVCs do not support X.25 PDN service. See "X.25 Gateway and X.25 PVCs" on page -6.

Event Messages

The following OSPF event messages supplement those in *Event Messages for Routers*.

Entity Code/Event Code **12/121**

Decimal Identifier **16780409**

Severity: Warning

Message: Invalid MOSPF configuration: wfOspfMulticastExtensions == <*value of Multicast Extensions parameter*>

Meaning: OSPF has detected a configuration error for the MOSPF extension.

Action: Change the value of the Configuration Manager > Protocols > IP > OSPF > Global > Multicast Extensions parameter to a valid value for your configuration.

Entity Code/Event Code **12/122**

Decimal Identifier **16780410**

Severity: Fault

Message: Unexpected death of OSPF MSPF gate

Meaning: OSPF experienced a fatal error and is restarting automatically.

Action: Call the Bay Networks Technical Solutions Center if RSVP fails to restart.

Entity Code/Event Code **12/123**

Decimal Identifier **16780411**

Severity: Fault

Message: Unexpected death of OSPF MOSPF_LSA gate

Meaning: OSPF experienced a fatal error and is restarting automatically.

Action: Call the Bay Networks Technical Solutions Center if RSVP fails to restart.

Guidelines from Previous BayRS Releases

The following guidelines remain in effect for Version 12.00. They supplement the instructions in the 12.00 documentation set.

Adding RADIUS to BayRS Virtual Network Router Suites

The RADIUS executable file (*radius.exe*) does not appear in the following BayRS virtual network router (VNR) suites:

- BN VNR Flash Card (PN 114620-A Rev. C)
- ATM VNR Flash Card (PN 114657-A Rev. C)
- The following CD-ROM (PN 114647) router platform selections:
  - -- bn/vnr "Backbone Node VNR"
  - -- 5780 "Model 5780 ATM Router installed on System 5000"

To add RADIUS to these software suites:

1. **Log in to the following FTP site as anonymous:**

   192.32.253.5

2. **Type the following from the FTP prompt:**

   cd /perm/radius_12.00

3. **Set the transfer preference to binary (for example, type bin).**
4. **Download the *radius.exe* file from the FTP site (for example, type get radius.exe).**
5. **Place the executable into the default directory of your workstation.**

   The default directory on a PC is *wf\builder.dir\rel1102\bn810*.
   The default directory on a UNIX platform is *$BUILDER_DIR/rel1102/bn810*.

Note: The BUILDER_DIR resides in the *.cshrc*, *.login*, or other equivalent startup file.

6. **Start Image Builder and open the image to which you want to add *radius.exe*.**

7. **Click on Details in the Available Components box, select the *radius.exe* file, and click on Add.**
8. **Check the size of the *radius.exe* file (compressed -- approximately 22KB; uncompressed -- approximately 45KB).**

   If the file does not match the expected size, repeat this procedure or call the Bay Networks Technical Solutions Center for assistance.
9. **Save the image that includes RADIUS and exit Image Builder.**
10. **Use FTP to transfer the new image to the router and reboot the router, following the directions in *Modifying Software Images for Routers*.**

    You can now use RADIUS on this router.

For further information about using Image Builder, refer to *Modifying Software Images for Routers*.

ARN Memory Requirements

The following features require a minimum DRAM configuration of 8 MB:

- DLSw
- ISDN BRI
- Token ring base or expansion module configurations

Cycling Power to the ARN

To ensure a complete power cycle, we recommend that you wait at least 4 seconds between turning off the ARN and turning it back on.

Caution: Cycling power to the ARN too quickly could cause an error.

Memory Allocation on ARN Routers Not Supported

Although you can change the default memory allocation on other Bay Networks router platforms, the ARN platform does not support this “buffer carving” feature.

On the ARN, Site Manager does not support the Admin > Kernel Configuration option, and the Technician Interface does not support **set** command for wfKernCfgParamEntry objects. Attempting to set wfKernCfgParamGlobMem on the ARN results in a warning message.

Network Booting on DSU/CSU Interfaces

AN and ANH DSU/CSU interfaces do not support network booting in Version 12.00. The ARN DSU/CSU supports network booting only over interfaces configured for 64-Kb/s Clear Channel service.

Configuring NTP Using the Technician Interface

When you use the Technician Interface to configure the Network Time Protocol (NTP), you must configure NTP on each slot on the router to ensure that NTP initializes correctly.

You can configure NTP on each slot by setting the following MIB variable from the Technician Interface:

set wfProtocols.68.0 0xffffffff;commit

68 represents the *wfNTPLoad* attribute.

Setting Modem Initialization Strings Using the Technician Interface

Several AT modem commands contain a dollar sign ($) or backslash (\). The Technician Interface uses the $ to reference a variable and the \ to prevent the substitution of a variable. If one of these symbols appears in the wfModemEntry.wfModemCfgInitString initialization command, the Technician Interface does not set the string. For example:

```
[1:1]$ get wfModemEntry.wfModemCfgInitString.1.2

wfModemEntry.wfModemCfgInitString.1.2 = "ATF"
```

```
[1:1]$ set wfModemEntry.wfModemCfgInitString.1.2 "AT$SB64000";commit

Variable: Undefined Variable - SB64000
```

The Technician Interface interprets the command as containing an undefined variable and does not change the MIB value.

To set the MIB variable, you must add a backslash (\) in front of the symbol causing the confusion (that is, the $ or \). For example:

```
[1:1]$ get wfModemEntry.wfModemCfgInitString.1.2

wfModemEntry.wfModemCfgInitString.1.2 = "ATF"

[1:1]$ set wfModemEntry.wfModemCfgInitString.1.2 "AT\$SB64000";commit
```

Configuring Data Encryption Services

The following sections are amendments to *Configuring Data Encryption Services*.

Data Encryption Availability

Data encryption is available for purchase as a separate CD-ROM in one of two versions, 40-bit or 56-bit. Each version requires a special version of Site Manager, which is included on the appropriate CD.

The 56-bit encryption option is generally available only in the United States and Canada. U.S. law allows export of 56-bit encryption only with a U.S. export license. For more information on the export, import, and use of encryption outside the United States and Canada, refer to the software license agreement.

Installing Software Encryption on an HP Platform

When you copy the *wep.exe* file to an HP platform, it is automatically renamed *WEP.EXE;1*. You must rename the file back to *wep.exe*. You can do this by issuing the following command:

mv “WEP.EXE;1” wep.exe

Note that you must use quotation marks before and after *WEP.EXE;1*.

Data Encryption and Dial Services

You can configure PPP dial backup for a Frame Relay circuit that uses data encryption. Be aware, however, that if the primary circuit fails, data that travels over the backup circuit is unencrypted.

Protocols Supported

BayRS Version 12.00 supports the following bridging/routing protocols and router configuration features:

- AppleTalk and AppleTalk Update-based Routing Protocol (AURP)
- Advanced Peer-to-Peer Networking (APPN)
- Asynchronous transfer mode (ATM)
- ATM Data Exchange Interface (ATMDXI)
- ATM LAN Emulation (802.3 and 802.5)
- Bandwidth Allocation Protocol (BAP)
- Binary Synchronous Communication Type 3 (BSC3)
- Bootstrap Protocol (BootP)
- Border Gateway Protocol (BGP-3 and BGP-4)
- Bisync over TCP (BOT)
- Classless interdomain routing (CIDR)
- Data compression
- Data link switching (DLSw)
- DECnet Phase IV Routing Protocol
- Distance Vector Multicast Routing Protocol (DVMRP)
- Dynamic Host Configuration Protocol (DHCP)
- Exterior Gateway Protocol-2 (EGP-2)
- Frame relay
- File Transfer Protocol (FTP)
- HP Probe Protocol

- Integrated Services Digital Network (ISDN)
- Interface redundancy
- Internet Gateway Management Protocol (IGMP)
- Internet Protocol (IP)
- Internet Protocol Version 6 (IPv6)
- IPv6 PPP Control Protocol (CP)
- Internet Control Message Protocol (ICMP)
- Internet Packet Exchange (IPX) Protocol
- Internet Stream Protocol (ST2)
- Learning Bridge Protocol
- Logical Link Control 2 (LLC2) Protocol
- Multicast OSPF (MOSPF)
- Native Mode LAN (NML) Protocol
- Network Core Protocol
- Network Time Protocol (NTP)
- Open Shortest Path First (OSPF) Protocol
- Open Systems Interconnection (OSI) Routing Protocol
- Point-to-Point Protocol (PPP)
- Polled Asynch protocol (PAS), also called Asynch Passthru over TCP
- Protocol prioritization
- Qualified Logical Link Control (QLLC)
- Remote Authentication Dial-In User Service (RADIUS)
- RaiseDTR dialup
- Resource Reservation Protocol (RSVP)
- Routing Information Protocol (RIP)
- Router discovery
- Router redundancy
- Service Advertisement Protocol (SAP)

- Simple Network Management Protocol (SNMP)
- Source Routing Bridge Protocol
- Source Routing Bridge Protocol over ATM permanent virtual circuits (PVCs)
- Spanning Tree Protocol
- Switched multimegabit data service (SMDS)
- Synchronous Data Link Control (SDLC)
- Telnet Protocol (Inbound and Outbound)
- Transmission Control Protocol (TCP)
- Transparent Bridge
- Transparent-to-Source Routing Translation Bridge
- Trivial File Transfer Protocol (TFTP)
- V.25BIS dialup
- Virtual Networking System (VINES)
- X.25 Protocol
- XMODEM and YMODEM Protocols
- Xerox Network Systems (XNS) Protocol

Standards Supported

Table 4 lists the request for comments (RFCs) and other standards documents with which Version 12.00 complies. Version 12.00 may support additional standards that are not listed in this table.

Table 4. Standards Supported by Version 12.00

Standard	Description
ANSI T1.107b-1991	Digital Hierarchy - Supplement to formats specifications
ANSI T1.404	DS3 Metallic Interface Specification
ANSI X3t9.5	Fiber Distributed Data Interface (FDDI)
Bellcore FR-440	Transport Systems Generic Requirements (TSGR)
Bellcore TR-TSY-000009	Asynchronous Digital Multiplexes, Requirements and Objectives
Bellcore TR-TSY-000010	Synchronous DS3 Add-Drop Multiplex (ADM 3/X) Requirements and Objectives
IEEE 802.1	Logical Link Control (LLC)
IEEE 802.3	Carrier Sense Multiple Access with Collision Detection (CSMA/CD)
IEEE 802.5	Token Ring Access Method and Physical Layer Specifications
IEEE 802.10	Bridge with Spanning Tree
ITU Q.921	ISDN Layer 2 Specification
ITU Q.921	ISDN Layer 3 Specification
ITU X.25	Interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuits
RFC 768	User Datagram Protocol (UDP)
RFC 791	Internet Protocol (IP)
RFC 792	Internet Control Message Protocol (ICMP)

(continued)

Table 4. Standards Supported by Version 12.00 *(continued)*

Standard	Description
RFC 793	Transmission Control Protocol (TCP)
RFC 813	Window and Acknowledgment Strategy in TCP
RFC 826	Ethernet Address Resolution Protocol
RFC 827	Exterior Gateway Protocol (EGP)
RFC 854	Telnet Protocol Specification
RFC 855	Telnet Option Specification
RFC 856	Telnet Binary Transmission
RFC 857	Telnet Echo Option
RFC 858	Telnet Suppress Go Ahead Option
RFC 859	Telnet Status Option
RFC 860	Telnet Timing Mark Option
RFC 861	Telnet Extended Options: List Option
RFC 863	Discard Protocol
RFC 877	Transmission of IP Datagrams over Public Data Networks
RFC 879	TCP Maximum Segment Size and Related Topics
RFC 888	"STUB" Exterior Gateway Protocol
RFC 894	Transmission of IP Datagrams over Ethernet Networks
RFC 896	Congestion Control in IP/TCP Internetworks
RFC 903	Reverse Address Resolution Protocol
RFC 904	Exterior Gateway Protocol Formal Specification
RFC 919	Broadcasting Internet Datagrams
RFC 922	Broadcasting Internet Datagrams in Subnets
RFC 925	Multi-LAN Address Resolution
RFC 950	Internet Standard Subnetting Procedure

(continued)

Table 4. Standards Supported by Version 12.00 *(continued)*

Standard	Description
RFC 951	Bootstrap Protocol
RFC 959	File Transfer Protocol
RFC 994	Protocol for Providing the Connectionless-mode Network Service
RFC 1009	Requirements for Internet Gateways
RFC 1027	Using ARP to Implement Transparent Subnet Gateways
RFC 1042	Transmission of IP over IEEE/802 Networks
RFC 1058	Routing Information Protocol
RFC 1075	Distance Vector Multicast Routing Protocol (DVMRP)
RFC 1076	Redefinition of Managed Objects for IEEE 802.3 Repeater Devices (AN Hubs only)
RFC 1079	Telnet Terminal Speed Option
RFC 1084	BOOTP Vendor Information Extensions
RFC 1091	Telnet Terminal-Type Option
RFC 1108	Security Options for the Internet Protocol
RFC 1112	Host Extensions for IP Multicasting Appendix I. Internet Group Management Protocol
RFC 1116	Telnet Line-mode Option
RFC 1139	Echo Function for ISO 8473
RFC 1155	Structure and Identification of Management Information for TCP/IP-based Internets
RFC 1157	Simple Network Management Protocol (SNMP)
RFC 1163	BGP-2 (obsoleted by RFC 1267)
RFC 1164	Application of BGP in the Internet
RFC 1166	Internet Numbers
RFC 1188	Proposed Standard for the Transmission of IP over FDDI
RFC 1191	Path MTU Discovery

(continued)

Table 4. Standards Supported by Version 12.00 *(continued)*

Standard	Description
RFC 1209	Transmission of IP Datagrams over SMDS
RFC 1212	Concise MIB Definitions
RFC 1213	MIB for Network Management of TCP/IP-based Internets
RFC 1267	Border Gateway Protocol 3 (BGP-3; obsoletes RFC 1163)
RFC 1293	Inverse ARP for Frame Relay
RFC 1294	Multiprotocol Interconnect over Frame Relay (obsoleted by RFC 1490)
RFC 1304	Definition of Managed Objects for the SIP Interface Type
RFC 1305	Network Time Protocol
RFC 1315	Management Information Base for Frame Relay DTEs
RFC 1323	TCP Extensions for High Performance
RFC 1331	Point-to-Point Protocol (PPP; obsoleted by RFC 1661)
RFC 1332	PPP Internet Protocol Control Protocol (IPCP)
RFC 1333	PPP Link Quality Monitoring (obsoleted by RFC 1989)
RFC 1334	PPP Authentication Protocols
RFC 1350	The TFTP Protocol (Revision 2)
RFC 1356	Multiprotocol Interconnect on X.25 and ISDN in the Packet Mode
RFC 1376	PPP DECnet Phase IV Control Protocol (DNCP)
RFC 1378	PPP AppleTalk Control Protocol (ATCP)
RFC 1390	Transmission of IP and ARP over FDDI Networks
RFC 1377	OSI over PPP
RFC 1403	BGP OSPF Interaction
RFC 1434	Data Link Switching: Switch-to-Switch Protocol
RFC 1483	Multiprotocol Encapsulation over ATM AAL5
RFC 1490	Multiprotocol Interconnect over Frame Relay (obsoletes RFC 1294)

(continued)

Table 4. Standards Supported by Version 12.00 *(continued)*

Standard	Description
RFC 1552	The PPP Internetwork Packet Exchange Control Protocol (IPXCP)
RFC 1577	Classical IP and ARP over ATM
RFC 1583	OSPF Version 2
RFC 1585	MOSPF: Analysis and Experience
RFC 1634	Novell IPX over Various WAN Media (IPXWAN)
RFC 1638	PPP Bridging Control Protocol (BCP)
RFC 1654	Border Gateway Protocol 4 (BGP-4; obsoleted by RFC 1771)
RFC 1661	Point-to-Point Protocol (PPP; obsoletes RFC 1331)
RFC 1662	PPP in HDLC-like Framing
RFC 1717	PPP Multilink Protocol (MP; obsoleted by RFC 1990)
RFC 1755	Signaling Support for IP over ATM
RFC 1757	Remote Network Monitoring Management Information Base (RMON), for AN, ANH, and ARN equipped with Data Collection Module only
RFC 1762	PPP Banyan VINES Control Protocol (BVCP)
RFC 1763	PPP DECnet Phase IV Control Protocol (DNCP)
RFC 1764	PPP XNS IDP Control Protocol (XNSCP)
RFC 1771	Border Gateway Protocol 4 (BGP-4; obsoletes RFC 1654)
RFC 1795	Data Link Switching: Switch-to-Switch Protocol, Version 1
RFC 1819	Internet Stream Protocol, Version 2
RFC 1989	PPP Link Quality Monitoring (obsoletes RFC 1333)
RFC 1990	PPP Multilink Protocol (MP; obsoletes RFC 1717)
RFC 2138	Remote Authentication Dial In User Service (RADIUS)
RFC 2139	RADIUS Accounting
RFC 2205	Resource ReSerVation Protocol (RSVP) -- Version 1 Functional Specification

(continued)

Table 4. Standards Supported by Version 12.00 *(continued)*

Standard	Description
VINES 4.11	BayRS works with the Banyan VINES 4.11 standard. BayRS Version 8.10 and later also supports VINES 5.50 sequenced routing.

Flash Memory Cards Supported

You use Personal Computer Memory Card International Association (PCMCIA) flash memory cards to store the software image and the configuration files in Bay Networks routers. Table 5 lists the flash memory cards approved for use.

Table 5. Approved Flash Memory Cards

Size	Vendor	Part Number
4 MB	Advanced Micro Devices (AMD)	AMC004CFLKA-150
	AMP	797262-3
		797263-2
	Centennial	FL04M-20-11119
		FL04M-20-11138
	Epson	HWB401BNX2
	IBM	IBM17O0400D1DA-25
	Intel	IMC004FLSAQ1381

(continued)

Table 5. Approved Flash Memory Cards *(continued)*

Size	Vendor	Part Number
8 MB	AMD	AMC008CFLKA-150
		AMC008CFLKA-200
		AMC008CFLKA-250
		AMC008DFLKA-150
		AMC008DFLKA-200
		AMC008DFLKA-250
	Centennial	FLO8M-25-11119-01
		FLO8M-15-11119-01
		FLO8M-20-11138
		FLO8M-20-11119-01
	Epson	HWB801BNX0
	Intel	IMC008FLSP/Q1422
16 MB	Centennial	FL16M-20-11119-03
	Epson	HWB161BNX2